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First Named Inventor: Mark B. Whipple
(Or Application Identifier)

TRANSMITTAL FOR U.S. PATENT APPLICATION
UNDER 37 C.F.R. § 1.53(b)

Box Patent Application
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Washington, D.C.   20231

Sir:

    Transmitted herewith for filing is the patent application
entitled:

    SYSTEM AND METHOD FOR MANAGING EVENT PUBLICATION AND
    SUBSCRIPTION

The enclosed application is:
_x_ Original

Enclosed are:

_x_ Specification, Claims and Abstract (_22__ Total Pages)
_x_ Drawing(s)(_2_ Total Sheet(s) of_X__ Formal ___ Informal)
_x_ Combined Declaration and Power of Attorney(_3_ Total Pages)
    _x_ Newly executed (original or copy)

_x_ An Assignment of the invention to i2 Technologies, Inc. is
    attached. A separate cover sheet in compliance with 37
    C.F.R. § 3.28 and § 3.31 is included with an Assignment
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Applicant is a _X__ large ___ small entity.

FEE CALCULATION (LARGE ENTITY)					FEE
					Basic Fee
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Total Claims:	22	-20 =	2	X $18.00 =	$36.00
Independent Claims	4	- 3 =	1	X $78.00 =	$78.00
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__X__ Enclosed is a check in the amount of $\underline{804.00}$ for fees.

__X__ Please charge any additional fees required by this paper to Deposit Account No. 02-0384 of BAKER BOTTS L.L.P.

Respectfully submitted,

BAKER BOTTS L.L.P.
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Mark B. Whipple

Date Filed: March 23, 2000

Title: SYSTEM AND METHOD FOR MANAGING
                               EVENT PUBLICATION AND SUBSCRIPTION

BOX PATENT APPLICATION

Honorable Assistant Commissioner

   For Patents

Washington, D.C.   20231

Dear Sir:

<u>CERTIFICATE OF MAILING BY EXPRESS MAIL</u>

I hereby certify that the attached Patent Application (22 Pages), Declaration and Power of Attorney, 2 sheets of Formal Drawings, Assignment Cover Sheet, Assignment, Fee Transmittal, this Certificate of Mailing, check in the amount of $40.00 and check in the amount of $804.00 are being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. § 1.10 on this 23rd day of March, 2000 and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

Willie Jiles

Willie Jiles

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No. EL501047820US
Attorney's Docket No.:
020431.0563

SYSTEM AND METHOD FOR MANAGING EVENT PUBLICATION AND SUBSCRIPTION

TECHNICAL FIELD OF THE INVENTION

This invention relates generally to the field of computers and computer databases and more specifically to a system and method for managing event publication and subscription.

BACKGROUND OF THE INVENTION

The increasing complexity of the relationships among business entities has led to the rising demand for improved event publication and subscription systems. In many business situations, a business entity may want to be notified when a certain event occurs, for example, when a purchase order arrives. The entity may also want to be notified in a particular manner, for example, by receiving an e-mail message about the event. The entity may not need information regarding the other entity that produced the event, and may only need information that the event occurred and perhaps information about the event itself. Event subscription and publication may be used to request or to send notification of an event. To request notification, an event consumer may subscribe to an event manager for a particular event. The event manager monitors an event producer to see if the event occurs. When the event occurs, the event manager notifies the event consumer by publishing the event to the event consumer in the manner specified by the event consumer.

While known approaches have provided improvements over prior approaches, the challenges in the field of computers and computer databases have continued to increase with demands for more and better techniques having greater flexibility and effectiveness. Therefore, a need has arisen for a new method and system for managing event publication and subscription.

SUMMARY OF THE INVENTION

In accordance with the present invention, a method and system for publishing and subscribing in event systems are provided that substantially eliminate or reduce the disadvantages and problems associated with previously developed systems and methods.

According to one embodiment of the present invention, a system for publishing and subscribing in event systems is disclosed that comprises a logical event manager. A physical event manager communicates with the logical event manager and a first and a second event producer-consumer. The physical event manager includes a first mapper that translates between the logical event manager and the first event producer-consumer and a second mapper that translates between the logical event manager and the second event producer-consumer. More specifically, a listener-sender includes the first mapper and communicates with the logical event manager and the first and the second event producer-consumer.

According to one embodiment of the present invention, a method for publishing and subscribing in event systems is disclosed. A logical event manager receives a logical event from an event producer. The logical event is then communicated from the logical event manager to a physical event manager. The physical event manager uses a first mapper to translate the logical event to a first signal and a second mapper to translate the logical event to a second signal. The first signal is published to a first event consumer, and the second signal is published to a second event consumer.

According to another embodiment of the present invention, a method for publishing and subscribing in event systems is disclosed. A physical event manager receives a first signal from a first event producer and a second signal from a second event producer. A first mapper translates the first signal to a first logical event, and a second mapper translates the second signal to a second logical event. The first and second logical events are then communicated to a logical event manager.

According to another embodiment of the present invention, a method for publishing and subscribing in event systems is disclosed. A physical event manager receives a first signal from an event producer. A first mapper translates the first signal to a logical event. The logical event is communicated to a logical event manager. The logical event is then communicated to the physical event manager, where a second mapper translates the logical event to second signal. The second signal is communicated to an event consumer.

A technical advantage of the present invention is that the event manager has a physical event manager with mappers that translate events from multiple heterogeneous external entities to logical events, and vice-versa. By using the physical event manager, an event consumer may subscribe to an event without knowledge of the physical mechanisms of the event producer. Conversely, an event producer may publish an event without knowing the physical mechanisms of the event consumer, allowing for multiple heterogeneous event publication and subscription. Another technical advantage of the present invention is that the physical event manager may accommodate event types not possible in known approaches

to event publication and subscription. For example, the physical event manager can search a directory for the appearance of a file, or can listen to a database for the occurrence of a trigger. Consequently, the present invention expands the variety of events and external entities, thus greatly increasing the flexibility and applicability of event publication and subscription systems.

Other technical advantages are readily apparent to one skilled in the art from the following figures, descriptions, and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and for further features and advantages, reference is now made to the following description, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a block diagram of one embodiment of a system that may be used in accordance with the present invention; and

FIGURE 2 is a flowchart demonstrating one embodiment of a method that may be used in accordance with the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

An embodiment of the present invention and its advantages are best understood by referring to FIGURES 1 and 2 of the drawings, like numerals being used for like
5   and corresponding parts of the various drawings.

In an event publication and subscription system, multiple entities may communicate with an event manager of a computer process. For example, a factory machine may subscribe to the event manager for notification of
10   the occurrence of an event called "start machine." The event manager may monitor, or listen, to various event producers that trigger the start machine event. For example, the calling of a particular method in a CORBA server or the ringing of a modem may trigger the start
15   machine event. When the start machine event occurs, the event manager publishes notification of the event to the factory machine, which is started as a result.

In order to communicate information between the event manager and the event producers and consumers
20   external to the computer process, the events understandable by the external event producers and consumers must be translated to logical events understandable by the event manager. Known approaches to translating events place a translator between the event
25   manager and the external entities. These approaches, however, increase the complexity and thus the cost of the system. Other known approaches attempt to change the event manager to accommodate different external entities. However, it may be too difficult to change the event
30   manager to accommodate different external entities, and the event manager may not able to simultaneously handle different external entities. Other known approaches

attempt to change the external entity. However, the external entity, for example, a modem, may simply be unable to be changed to communicate directly with the event manager. Furthermore, none of the above known approaches allow the event manager to accommodate certain types of events. For example, the event manager cannot detect the appearance of a file on an external entity using these approaches, precluding notification of this event.

FIGURE 1 is a block diagram of one embodiment of a system 100 that may be used in accordance with the present invention. In general, system 100 may include external event publisher/consumers (EPCs) 102-112 in communication with an event manager 114 in a computer process 101. External EPCs 102-112 may subscribe to event manager 114 for notification of an event. When the event occurs, event manager 114 publishes the event to subscribing external EPCs 102-112. External EPCs 102-112 may also produce events that require notification. Event manager 114 monitors external EPCs 102-112 for the occurrence of the events. EPCs 116-120 internal to computer process 101 may also subscribe and publish to event manager 114.

Specifically, external EPCs 102-112 may include a variety of external entities. For example, external EPC 104 may be a modem, and external EPC 106 may be a factory machine. Factory machine 106 may subscribe to event manager 114 to be notified of the ringing of modem 104, for example. Event manager 114 then monitors, or listens, to modem 104 for the event. When modem 104 rings, event manager 114 notifies factory machine 106 of the event. As another example, external EPC 108 may be a

database.   External EPC 102 may subscribe to event
manager 114 for a change in a database entry in database
108.   As another example, external EPC 110 may be an
input file and external EPC 112 may be an output file.
Output file 112 may subscribe to the notification of the
writing of a purchase order file to input file 110, which
was not possible with known approaches to publication and
subscription.   Note that system 100 allows for simple
effective multiple heterogeneous event exchange among a
variety of external entities, which was unavailable with
known approaches to publication and subscription.

In an embodiment of the present invention, event
manager 114 includes a logical event manager (LEM) 122 in
communication with a physical event manager 124, which
is, in turn, in communication with external EPCs 102-112.
Physical event manager 124 monitors external EPCs 102-112
for signals, translates the signals to logical events,
and communicates the logical events to logical event
manager 122 for further processing.   Physical event
manager 124 includes listener-senders (LSs) 126-134,
which in turn include mappers 136-144.   Listener-senders
126-134 monitor external EPCs 102-112 for signals and
translate the signals to logical events using mappers
136-144.   A listener-sender 132 may even search a
directory of database 108 for a file, a process
unavailable with known approaches to publication and
subscription.   Each listener-sender may monitor a
specific type of device.   For example, listener-sender
134 monitors files 110 and 112, while listener-sender 128
monitors serial devices modem 104 and factory machine
106.   The mapper receives a specific type of signal from
a specific type of external entity, extracts data from

the event, and translates it into a logical event. The mapper may translate the signal to the logical event by, for example, performing a direct correlation or by using a lookup table that contains the correlation between the logical event and the signal. After the signals are translated into logical events, listener-senders 126-134 communicate the logical events to logical event manager 122. Logical event manager 122 receives the logical events and determines which internal and/or external EPCs are subscribing to the logical events.

Logical event manager 122 publishes the logical events to physical event manager 124, which translates them to signals using the appropriate mapper and sends them to the subscribing external EPCs 102-112 using the appropriate listener-sender. Alternatively, logical event manager 122 may receive logical events from and publish logical events to internal EPCs 116-120.

FIGURE 2 is a flowchart demonstrating one embodiment of a method for managing event publication and subscription of the present invention. The flowchart is used to describe an exemplary embodiment where an event of interest, a "start machine" event can be produced by either of two mechanisms: a call to modem 104 connected to a telephone, or the insertion of a value into database 108. Two external entities act upon the occurrence of the start machine event: factory machine 106 starts operation, and input file 112 records the occurrence of the start machine event. All four external entities 104, 106, 108, and 112 converse using different protocols.

The method begins at step 202, where computer process 101 instantiates event manager 114. Computer

process 101 defines a set of physical events, for example, listener-senders 126, 128, 132, and 134, where each physical event corresponds to an external entity and a set of mappers. At step 204, the event producers modem 104 and database 108 are defined. Either modem 104 or database 108 can produce a native signal for the start machine event. For example, modem 104 may produce a native signal. Physical event listener-sender 128, for example, a serial port accessor, may interpret the native signal. Mapper 138, for example, a modem string mapper, maps the signal to the equivalent start machine logical event. Alternatively, database 108 may produce a native signal, for example, a trigger. Physical event listener-sender 132 interprets the native signal. Mapper 142 maps the signal to the start machine logical event.

At step 206, event consumers factory machine 106 and output file 112 are defined. Factory machine 106 may receive a signal via its native mechanism, for example, a serial port. Listener-sender 128 and mapper 140, for example, machine serial codes, may interpret the start machine logical event and translate and transmit the event to factory machine 106. Output file 112 may receive a signal via its native mechanism, for example, a computer disk write. Listener-sender 134, for example, a file accessor, and mapper 144 may interpret the start machine logical event and translate and transmit the event to output file 112.

At step 208, listener-senders 128 and 134 subscribe to the start machine logical event on behalf of factory machine 106 and output file 112, respectively. At step 210, listener-senders monitor event producers modem 104 and database 108, respectively. Listener-senders 128 and

132 use native protocols to listen for signals from external entities modem 104 and database 108, respectively.

At step 212, an event producer produces a native signal. In one embodiment, event producer modem 104 receives a ring indication and signals listener-sender 128 via modem strings on the serial port. At step 214, mapper 138 translates the modem string to a start machine logical event. At step 216, the logical event is published to logical event manager 122. At step 218, logical event manager 122 publishes logical event to physical event manager 124. Logical event manager 122 recognizes that there are logical event subscriptions from listener-senders 128 and 134 and publishes the logical events to listener-senders 128 and 134. At step 220, listener-senders publish signals to event consumers. Mapper 140 translates the start machine logical event to protocol data understood by factory machine 106, and listener-sender 128 transmits the protocol data to factory machine 106. Similarly, mapper 144 translates the start machine logical event to a log file entry, and listener-sender 134 inserts data into output file 112, and the method terminates.

In another embodiment, at step 212, event producer database 108 produces a 'trigger' upon the insertion of data into a table. The trigger is understood by listener-sender 132. At step 214, mapper 142 translates the trigger notification to a start machine logical event. At step 216, the logical event is published to logical event manager 122. At step 218, logical event manager 122 publishes the logical event to physical event manager 124. Logical event manager 122 recognizes that

there are logical event subscriptions from listener-senders 128 and 134 and publishes the logical events to listener-senders 128 and 134. At step 220, listener-senders publish signals to event consumers. Mapper 140 translates the start machine logical event to protocol data understood by factory machine 106, and listener-sender 128 transmits the protocol data to factory machine 106. Similarly, mapper 144 translates the start machine logical event to a log file entry. and listener-sender 134 inserts data into output file 112, and the method terminates.

A technical advantage of the present invention is that the event manager has a physical event manager with mappers that translate events from multiple heterogeneous external entities to logical events, and vice-versa. Using the physical event manager, an event consumer may subscribe to an event without knowing the physical mechanisms of the event producer, and conversely an event producer may publish an event without knowing the physical mechanisms of the event consumer, allowing for multiple heterogeneous event publication and subscription. Another technical advantage of the present invention is that the physical event manager may accommodate event types not possible in known approaches to event publication and subscription. For example, the physical event manager can search a directory for the appearance of a file on a database. Consequently, the present invention expands the variety of events and external entities, thus greatly increasing the flexibility and applicability of event publication and subscription systems.

Although an embodiment of the invention and its advantages are described in detail, a person skilled in the art could make various alternations, additions, and omissions without departing from the spirit and scope of
5   the present invention as defined by the appended claims.

WHAT IS CLAIMED IS:

1. A system for managing event publication and subscription of event producer-consumers, the system comprising:

a logical event manager; and

a physical event manager in communication with the logical event manager and a first and a second event producer-consumer, wherein the physical event manager comprises:

a first mapper operable to translate between the logical event manager and the first event producer-consumer; and

a second mapper operable to translate between the logical event manager and the second event producer-consumer.

2. The system of Claim 1 further comprising a listener-sender having the first mapper and in communication with the logical event manager and the first and the second event producer-consumer.

3. The system of Claim 1 wherein the first mapper is operable to translate a signal occurring at the first producer-consumer to a logical event for the logical event manager.

4. The system of Claim 1 wherein the first mapper is operable to translate a logical event occurring at the logical event manager to a signal for the first producer-consumer.

5.   The system of Claim 1 wherein the first event consumer-producer is operable to subscribe to a logical event managed by the logical event manager.

5   6.   The system of Claim 1 wherein the logical event manager is operable to publish a signal to the first event consumer-producer.

7.   The system of Claim 1 wherein the first event
10   consumer-producer is operable to communicate a signal to the logical event manager.

8.   The system of Claim 1 wherein the physical event manager is operable to monitor the first producer-consumer
15   for a signal.

9.   A   method   for   managing   event   publication   and
subscription   of   event   producer-consumers,   the   method
comprising:

receiving   a   logical   event   from   an   event   producer   by   a
logical event manager;

communicating   the   logical   event   from   the   logical   event
manager to a physical event manager;

translating   the   logical   event   to   a   first   signal   by   the
physical event manager using a first mapper;

translating   the   logical   event   to   a   second   signal   by
the physical event manager using a second mapper;

publishing   the   first   signal   to   a   first   event   consumer;
and

publishing   the   second   signal   to   a   second   event
consumer.

10.   The   method   of   Claim   9   further   comprising
communicating   a   subscription   for   a   logical   event   from   the
first event consumer to the physical event manager.

11.   The method of Claim 9 further comprising:

communicating   a   first   subscription   for   a   logical   event
from   the   first   event   consumer   to   the   physical   event
manager; and

translating   the   first   subscription   into   a   first
logical subscription using the first mapper.

12.   The   method   of   Claim   9   further   comprising
instantiating   the   physical   event   manager   by   establishing
the   first   mapper   and   the   second   mapper,   wherein   the   first
mapper   is   associated   with   the   logical   event   and   the   first

consumer and the second mapper is associated with the logical event and the second consumer.

19

13. A method for managing event publication and subscription of event producer-consumers, the method comprising:

receiving a first signal from a first event producer
5   by a physical event manager;

receiving a second signal from a second event producer by the physical event manager;

translating the first signal to a first logical event using a first mapper;

10   translating the second signal to a second logical event using a second mapper;

communicating the first logical event to a logical event manager; and

communicating the second logical event to the logical
15   event manager.

14. The method of Claim 13 further comprising communicating a subscription for the first logical event from a first event consumer to the physical event manager.

20

15. The method of Claim 13 further comprising:

communicating a first subscription for a logical event from the first event consumer to the physical event manager; and

25   translating the first subscription into a first logical subscription using the first mapper.

16. The method of Claim 13 further comprising communicating the first logical event from the logical
30   event manager to a first event consumer.

17. The method of Claim 13 further comprising monitoring the first event producer for the first signal.

18. The method of Claim 13 further comprising instantiating the physical event manager by establishing the first mapper, wherein the first mapper is associated with the first logical event and the first event producer.

19. A method for managing event publication and subscription of event producer-consumers, the method comprising:

receiving a first signal from an event producer by a physical event manager;

translating the first signal to a logical event using a first mapper;

communicating the logical event to a logical event manager;

communicating the logical event to the physical event manager;

translating the logical event to second signal using the second mapper; and

communicating the second signal to an event consumer.

20. The method of Claim 19 further comprising communicating a subscription for the logical event from the event consumer to the physical event manager.

21. The method of Claim 19 further comprising monitoring the event producer for the first signal.

22. The method of Claim 19 further comprising instantiating the physical event manager by establishing the first mapper, wherein the first mapper is associated with the logical event and the event producer.

SYSTEM AND METHOD FOR MANAGING EVENT PUBLICATION AND SUBSCRIPTION

ABSTRACT OF THE DISCLOSURE

A system for publishing and subscribing in event systems is disclosed. The system comprises a logical event manager. A physical event manager communicates
5   with the logical event manager and a first and a second event producer-consumer. The physical event manager includes a first mapper that translates between the logical event manager and the first event producer-consumer and a second mapper that translates between the
10   logical event manager and the second event producer-consumer. A method for publishing and subscribing in event systems is disclosed. A logical event manager receives a logical event from an event producer. The logical event is communicated from the logical event
15   manager to a physical event manager. The physical event manager uses a first mapper to translate the logical event to a first signal, and a second mapper to translate the logical event to a second signal. The first and second signals are published to first and second event
20   consumers.

100

COMPUTER PROCESS

101

EVENT MANAGER

114   122   124

L-S

M₁ —136

102

EPC

128   126

116

EPC

L-S

M₂ —138

104

MODEM

M₃ —140

106

FACTORY MACHINE

LEM

EPC

118

PEM

108

L-S

M₄ —142

DATABASE

EPC

120

134   132

L-S

M₅ —144

110

INPUT FILE

112

OUTPUT FILE

FIG. 1

START

202 — COMPUTER PROCESS INSTANTIATES EVENT MANAGER

204 — COMPUTER PROCESS DEFINES EVENT PRODUCERS

206 — COMPUTER PROCESS DEFINES EVENT CONSUMERS

208 — LISTENER-SENDERS SUBSCRIBE TO LOGICAL EVENT ON BEHALF OF EVENT CONSUMERS

210 — LISTENER-SENDERS MONITOR EVENT PRODUCERS FOR SIGNALS

212 — EVENT PRODUCER PRODUCES SIGNAL

214 — MAPPER TRANSLATES SIGNAL TO LOGICAL EVENT

216 — LISTENER-SENDERS PUBLISH LOGICAL EVENT TO LOGICAL EVENT MANAGER

218 — LOGICAL EVENT MANAGER PUBLISHES LOGICAL EVENT TO PHYSICAL EVENT MANAGER

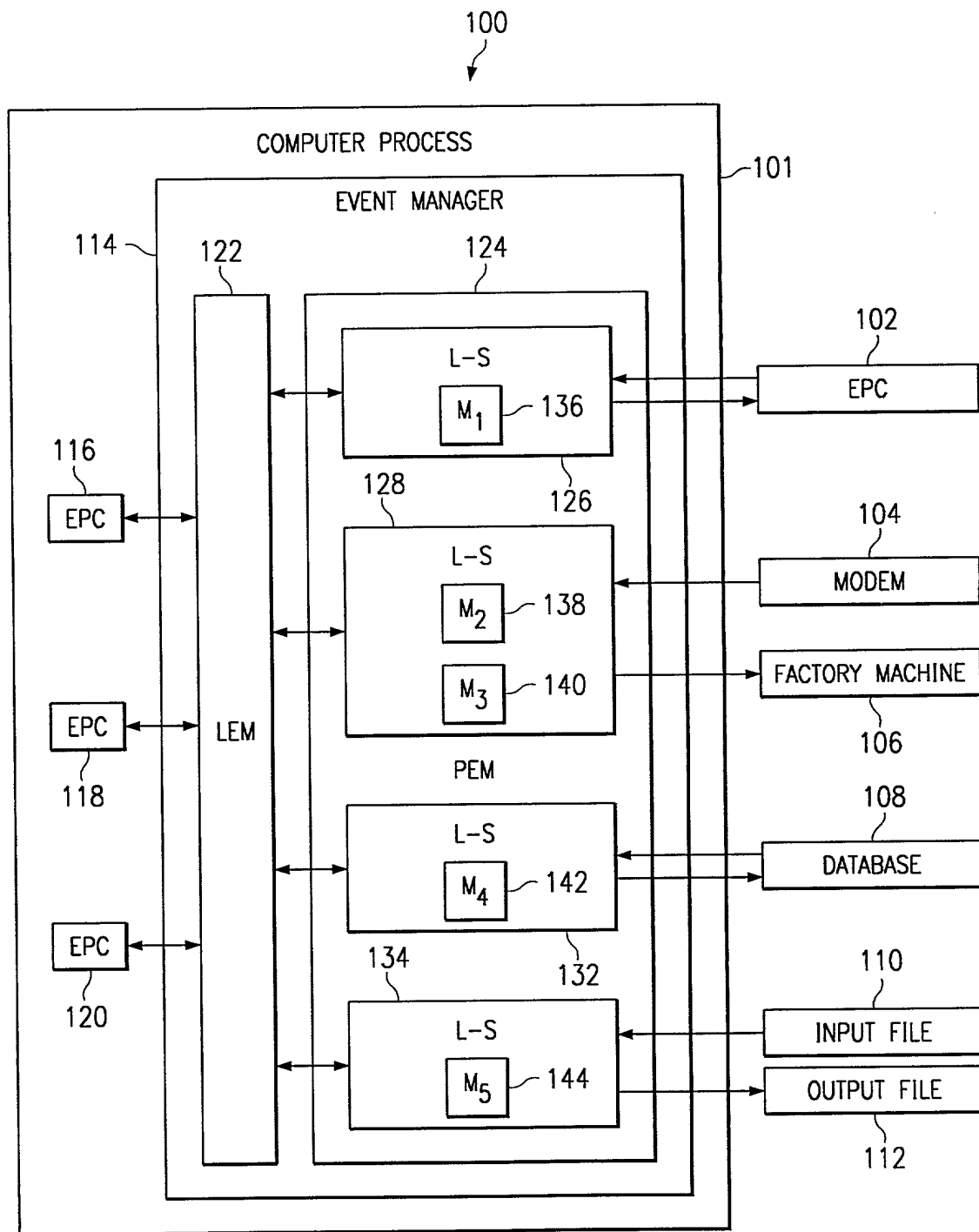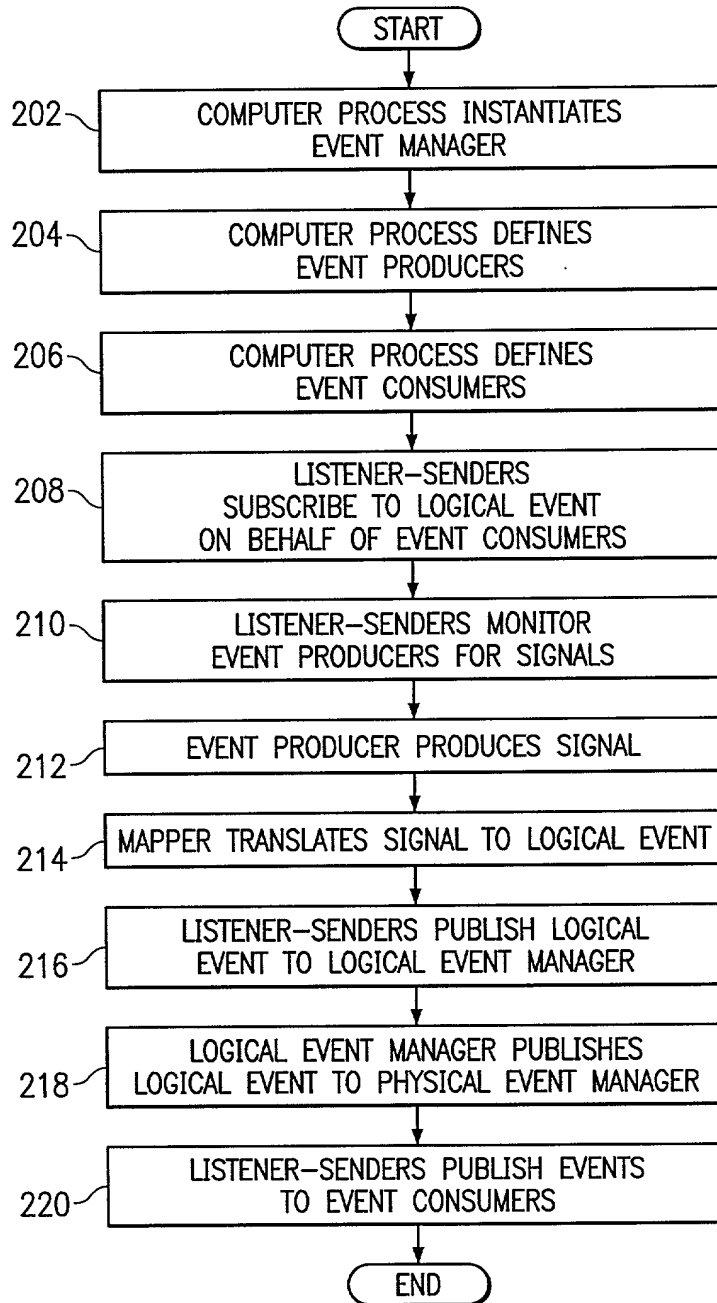220 — LISTENER-SENDERS PUBLISH EVENTS TO EVENT CONSUMERS

END

FIG. 2

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I declare that:

My residence, post office address and citizenship are as stated below next to my name; that I believe I am the original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention or design entitled SYSTEM AND METHOD FOR MANAGING EVENT PUBLICATION AND SUBSCRIPTION, the specification of which (check one):

     X   is attached hereto; or

    _____ was filed on ____ as Application Serial No. ____ and was

    amended on _____ (if applicable);

that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above; and that I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application(s) for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Number	Country	Date Filed	Priority Claimed (Yes) (No)

----------NONE----------

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application(s) in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. § 1.56 which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

Application Serial Number	Date Filed	Status

----------NONE---------

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all of the firm of Baker Botts L.L.P., my attorneys/agents with full power of substitution and revocation, to prosecute this application and to transact all business in the United States Patent and Trademark Office connected therewith, and to file and prosecute any international patent applications filed thereon before any international authorities.

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I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Full name of the sole inventor   Mark B. Whipple

Inventor's signature

Date   3/21/2000

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